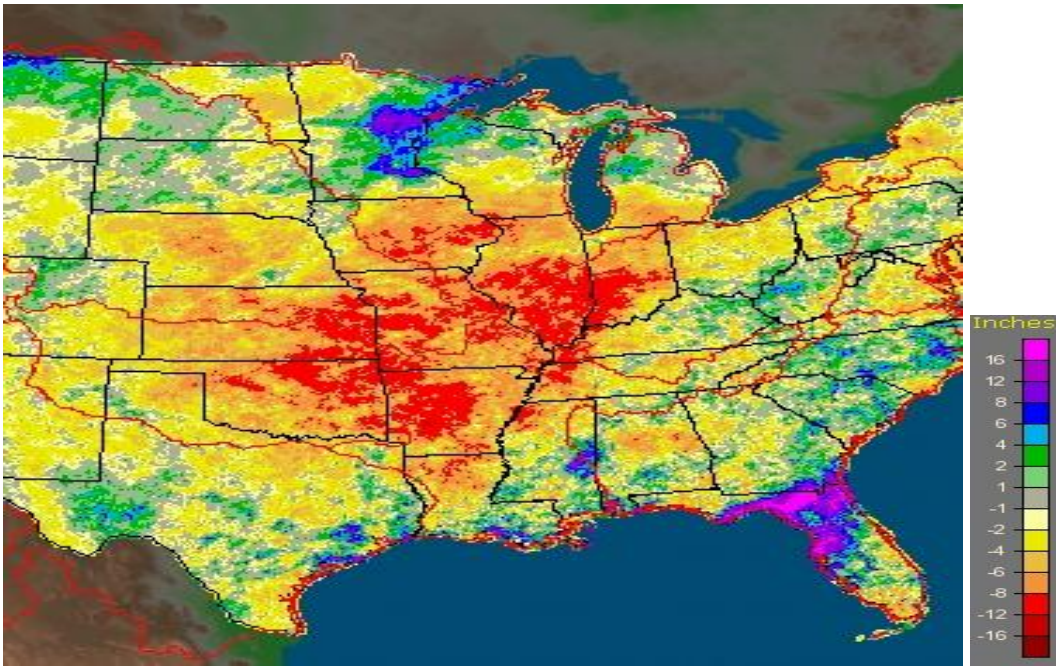
National Weather Service
Lower Mississippi River Forecast Center
Slidell, LA

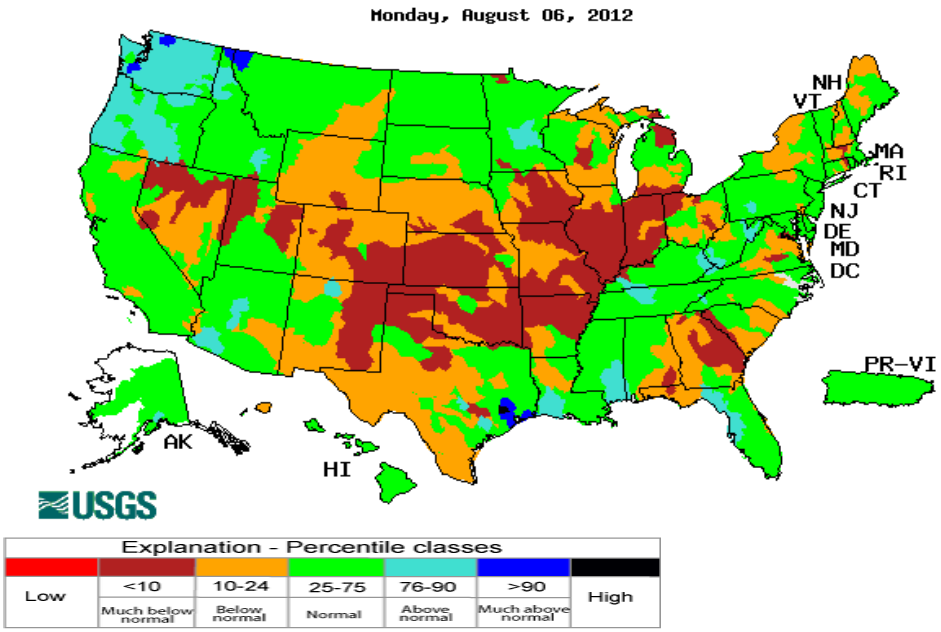
2012 Mississippi River Low water event

Conditions leading up to event (Spring through mid Summer)

- Warmer than normal temperatures from the Rockies to Atlantic.
- Three month rainfall over the middle Mississippi and Ohio Valleys has been 8 to 12 inches below normal or 10 to 50 percent of normal.
- Exceptional to serve drought conditions over the Missouri, Mississippi, & Ohio Valleys.
- 28-day average streamflow compared to historical streamflow are much below normal over the Mississippi and Ohio Rivers.



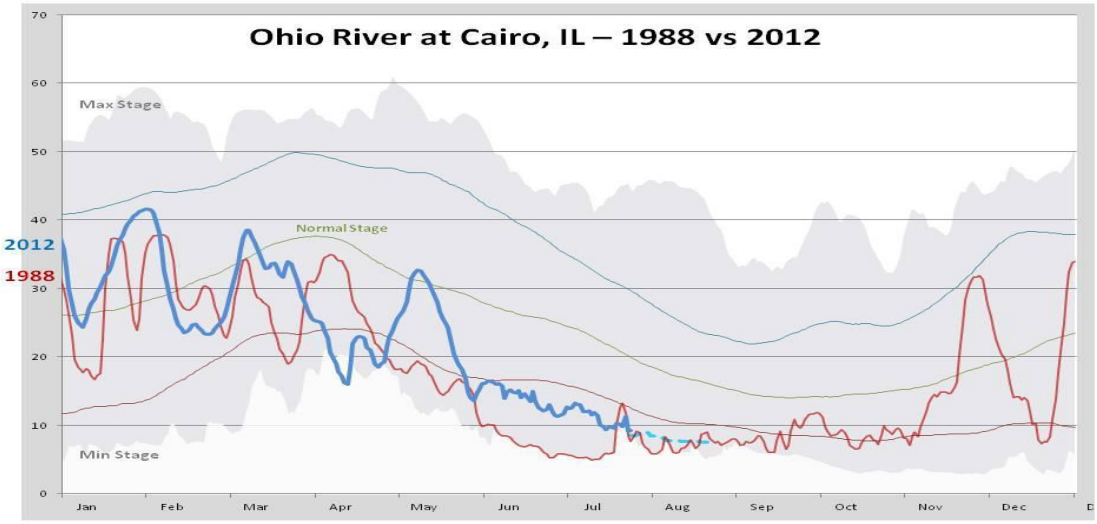
- NWS River Forecast Centers Precipitation Estimates
  - http://water.weather.gov/precip



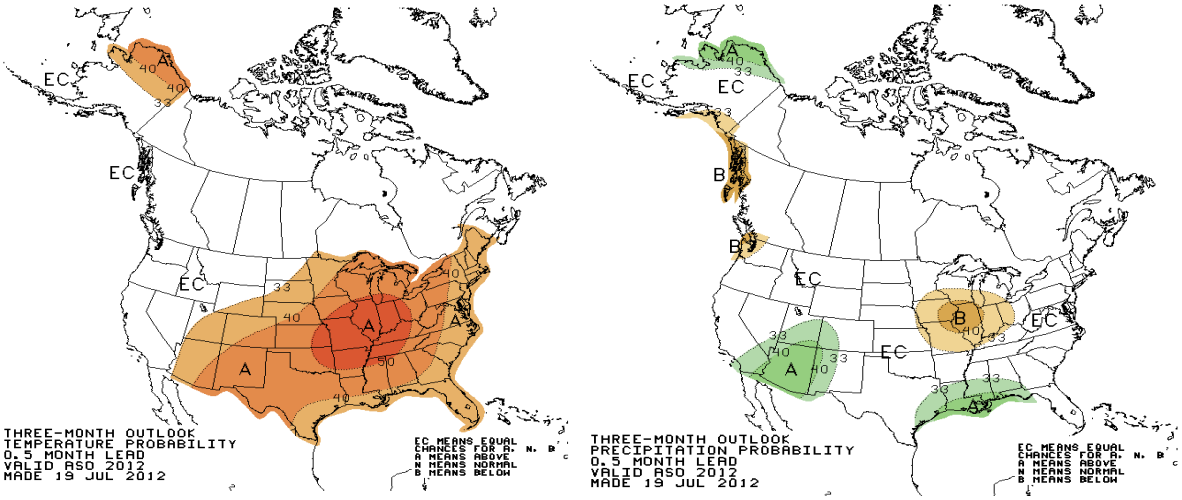
- USGS 28 Day Streamflow Percentile
    - http://waterwatch.usgs.gov/?m=pa28d_nwc&r=us&w=pa28d_nwc%2Cmap

Weather/River Outlook

- For the next 3 months, temperature and precipitation outlooks lean towards above normal temperatures and below normal precipitation over middle Mississippi and Ohio Valleys.
- US Seasonal Drought Outlook indicates the drought should persist over the middle section of the US.
- As of now…frontal boundaries over the Ohio Valley have produced enough rainfall to keep the Ohio and Mississippi Rivers from reaching record levels.
- Normally, low water occurs in the Fall so we potentially have several more months of low water conditions.
- At this time…the 28-day forecast which includes no future rainfall will have several locations getting stages within 1 to 2 feet of 1988 levels.



- 1988 vs 2012 stage comparison at Cario, IL (Courtesy of COE)
    - http://www.facebook.com/BPNMFloodway



- CPC 90 Day Temperature and Precipitation Outlooks Link
    - http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php

FAQ's for Mississippi River Stages

- Why should I not use the historical low stages for the Mississippi River as historical context for the Summer 2012 Mississippi River low flow event?

The Mississippi River channel has gone through many modifications [levees, channel dredging, control structures] since the period of record began. Stages recorded after 1940 have a greater likelihood of occurring with channel characteristics similar to those today.

River gauge locations have changed locations over the period of record from the late 1800s. These changes can alter the gauge zero for the observing site. Unless a conversion factor is known, you cannot make an accurate comparison to the 2012 stages and those observed in other low flow events

- What period of record should I be looking at to make as accurate a comparison as possible?

  Major channel modifications were completed in the late 1930s. Comparing 2012 stages to those from 1940 to present forward would be acceptable with the caveat that the gauge has not been moved or a conversion factor between the 2012 stage and the historical stage is known. One exception would be river locations in the Memphis Corps of Engineers (COE) district. The navigation channel from New Madrid, MO to Memphis, TN was modified extensively after the 1988 flood event with the improvements completed in the 1990s. So the 1988 stages levels can't be used for historical comparisons for this section of the the Mississippi River.

- Why are the 1988 low stages preferred as the historical context for the Summer 2012 Mississippi River low flow event?

  The 1988 event is the most recent low flow event. The 1988 event also occurred in the summer. Comparing the 2012 event to the 1988 event also accounts for seasonal factors such as evapotranspiration, vegetation type and cover, soil moisture, and temperature. See exception for Memphis COE district on the question above.

- What are the lowest stages for the entire period of record and 1988 stages to compare 2012 stages on the Mississippi River? (Courtesy of Bill Frederick and COE)

	ID	**Start Period of Record in manual**	**July 1988 Minimum Stage (Ft)**	**Minimum Daily Stage (Ft)**	**Date of Minimum Stage**
Cape Girardeau	CPGM7	1896	4.7	0.6	1/15/1909
Cairo	CIRI2	1858	4.9	-1.0	12/24/1871
New Madrid	NMDM7	1925	-1.5*	-1.5	1/12/1988
Caruthersville	CRTM7	1930	-0.1*	-0.72	10/26/1939
Memphis	MEMT1	1927	-10.7*	-10.7	7/10/1988

Helena	HEEA4	1926	-4.2	-4.2	7/11/1988
Arkansas City	ARSA4	1879	-5.0	-5.3	8/30/1936
Greenville	GEEM6	1925	-7.3	-5.9	2/1/1940
Vicksburg	VCKM6	1871	-1.6	-7.0	2/3/1940
Natchez	NTZM6	1871	2.6	-2.7 -1.65	Watermark in 1830 2/3/1940
Red River Landing	RRRL1	1851	10.1	4.64	11/4/1939
Baton Rouge	BTRL1	1872	1.8**	2.58	10/19/1939

* Channel improvements in the 1990's provided additional navigational capacity and makes low water events before the 1990's difficult to use in comparison. (MVM COE)
** From Baton Rouge, LA downstream to the mouth of the Mississippi River, tidal fluctuations make historical comparisons difficult to use in comparison.

- Why do I not have historical data for Tunica?

  This gauge is newer and doesn't have a period of record to be able to make historical comparisons.

- The NWS AHPS web page for each river forecast site has low flow records. Should I use these for comparisons?

  If the readings are from 1940 or later, you can use the respective stage reading for comparison with the following caveats referenced in the Table above.

- The forecast stages from the AHPS web page show stages for the next seven days between 2.2 and 2.7 feet. Why the big deal with low flow when the forecast shows we have 2 feet to go before we reach historical levels?

  The forecast is prepared for 6 hour intervals and does not reflect tidal fluctuations. The low stages in 1940 and 1964 were the lowest stages observed which likely occurred with ebb tide conditions. The 2012 forecast stages are the average stage for the entire high/low tide cycle so a higher or lower value may occur during the 6 hour interval.

- How come the 28 day forecast on the Ohio and Mississippi Rivers seems to be lower than what actually happens?

The 28 day forecast only uses future rainfall for the first day and no additional rainfall for the rest of the period. The purpose of the forecast is to capture what the lowest river stages will be based on no additional rainfall. If rainfall occurs during the 28 day period, river stages will be higher than indicated on the 28 day forecast.

- Where does it need to rain to help improve the current low water conditions?

  Rainfall would need to occur over the upper and middle Mississippi, Missouri, and Ohio Valleys. The majority of the flow comes from precipitation that occurs over this area. Rainfall over the Gulf Coast states of Louisiana and Mississippi doesn't make significant contributions to the Mississippi River since no large tributaries drain into the Mississippi Rivers.

Navigation General Information and Statistics

- The Mississippi River, the Ohio River, and their tributaries are critical arteries of the inland transportation system, carrying agricultural and petroleum products, coal, sand, gravel, chemicals, cement, steel, mulch, and other basic materials – the list of what is transported by barge is extensive, and includes the building blocks of things we as consumers purchase every day.

- The navigation community, COE, and Coast Guard are monitoring the low water conditions very closely to ensure that commodities can continue to move safely throughout the river system. The towing industry is voluntarily reducing draft and tow size to ensure safe operations, allowing traffic to continue to move.

- Delays and closures will negatively affect the nation's transportation system. It costs towing companies at least $10,000 a day when a towboat sits idle. This figure does not include the cost of the barges or the commodities that are destined for just-in-time delivery.

- The 1988 record drought was estimated to have cost the barge industry approximately $1 billion. (American Meteorological Society)

- The impact of losing even inches of water for navigation is tremendous, especially when you consider that with every one-inch loss of water, each barge is unable to move 17 tons of cargo. (Inland Waterways User Board, 2004)

- A tow on the Upper Mississippi, Illinois, and the Ohio Rivers typically has 15 barges resulting in a decrease of 255 tons in capacity for one tow with just one inch of water loss. The typical tow on the lower Mississippi is 30-45 barges, resulting in decreased capacity of up to 765 tons, again for just a one-inch loss of water.

- The severe drought conditions point to the particular importance of navigation flows out of the Missouri River into the Mississippi, which are helping to prevent further restrictions or closures of the middle Mississippi River and St. Louis Harbor. In 1988, almost 90% of the flows going past the Arch in St. Louis came out of the Missouri River. St. Louis Harbor is the largest agricultural port in the nation. The Missouri, Mississippi, and Illinois Rivers meet in St. Louis. Without sufficient water in St. Louis Harbor the entire upper Midwest would be cut off from the Port of New Orleans and the rest of the river system.

- A typical inland barge can carry the same amount of dry cargo (like agricultural products) as 16 rail cars or 70 semi-trailer trucks. Additionally, one barge can carry the same amount of liquid (fuels, for example) as 46 rail cars or 144 semi-trailer trucks. (Texas Transportation Institute)

- On the agricultural side alone, the Mississippi River supports between 50 and 60 percent of total U.S. corn exports and 30 to 45 percent of total U.S. soybean exports. Over 90 percent of the corn and soybean exports from the Gulf were transported via barges on the Mississippi River. (University of Missouri-Columbia, 2004)

- 73.7 million tons of commodities were shipped on the Upper Mississippi River, Illinois Waterway and Missouri River System. Most of the grain (31.6 million tons) went to the New Orleans and Baton Rouge areas of the Lower Mississippi River for eventual export to the world's markets. (ACOE Upper Mississippi/Illinois/Missouri Basin Profile, 2008)

- As waterborne transportation is the most environmentally friendly mode of commercial transportation, air emissions would also likely increase due to the increased highway and rail traffic.

Web Resources

Precipitation and Weather:

- National weather maps
  http://www.weather.gov/outlook_tab.php
- Precipitation Estimates
  http://water.weather.gov/precip/
  http://www.srh.noaa.gov/ridge2/RFC_Precip/
- Future Precipitation Forecasts
  http://www.hpc.ncep.noaa.gov/qpf/day1-5.shtml
  http://www.hpc.ncep.noaa.gov/pqpf_6hr/conus_hpc_pqpf_6hr.php

River Information and Forecast:

- Ohio and Mississippi River Status Map and Forecast
  http://www.srh.noaa.gov/lmrfc/?n=lowerohio,lowermississippi,andlowerarkansasrivers
  http://www.srh.noaa.gov/lmrfc/?n=lmrfc-mississippiandohioriverforecast

- 28-Day Ohio and Mississippi River Forecast and Hydrographs
  http://www.srh.noaa.gov/lmrfc/?n=ms_extended_forecast
  http://www.srh.noaa.gov/lmrfc/?n=esp
- COE Archive River Stages
  http://rivergages.com

Contributors:

- National Weather Service
- Corps of Engineers
- Navigation Community